

### **REMARKS**

Claims 6-13 and 39-67 are presented in this application. Claims 1-5 and 14-38 have been previously cancelled. Claims 6 and 7 have been amended to further define the invention. Claim 12 has been amended to make a minor, non-substantive correction. Claims 39, 42, 44, 50, 52, 62-66 have been amended to change words spelled in British English to their corresponding American English spellings, in order to aid future text searching in the U.S. The claim amendments and additions do not introduce new matter so they should be entered at this time to reduce the issues for appeal. It is believed that these amendments do not raise new issues that require a further search because the recitations were originally made in claims 1 and 2. Claims 1 and 2 were previously reviewed by the Examiner and their patentability was supported by the Applicants' previous arguments. For the reasons that follow, it is respectfully submitted that these changes overcome the rejections, thus reducing the issues for appeal. In particular, Applicant submits that these changes now place the entire application in condition for allowance.

### **Election/Restrictions**

The Applicants note the Examiner's comments. However, it is respectfully submitted that the claim set now on file, and the independent claims thereof, are linked and generic upon one another. Each relates to formation on an amorphous semiconductor based material of a plurality of emitter sites by laser crystallization. It is therefore submitted that all currently pending claims should be granted together.

### **Rejection under 35 U.S.C. § 102**

The Examiner has rejected claims 6-13 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,329,207 to Cathey et al. ("CATHEY"), stating that CATHEY teaches a field emission backplate comprising a plurality of emitter sites formed by laser crystallization of a planar thin body or thin film amorphous semiconductor based material. The Examiner has particularly relied upon column 5, lines 60-69 of CATHEY.

The Applicants respectfully disagree with the Examiner's contention that claim 6 is anticipated by CATHEY. Column 5, lines 63-68 of CATHEY reads as follows:

*"As shown in FIG 3D, another option is to recrystallize or reform the amorphous or polysilicon layer 8 to form single crystal silicon. After the recrystallization step, the silicon*

*layer is patterned 23, as illustrated in FIG 3E. An etching step is then performed **thereby defining** [emphasis added] the emitter tips".*

Thus it is clear from a careful reading of CATHEY that the entire amorphous silicon layer 8 is laser crystallized (see FIG 3D), thereafter patterned (see FIG 3E) and etched (see FIG 3F). Thus CATHEY teaches laser processing (crystallization) of the entire layer, followed by masking, followed by etching. Thus there is taught a three-step process in the formation of the emitter tips 13, only the final etching step defining the emitter tips 13. The emitter tips 13, which are formed from crystallized material, are provided upon the recrystallized silicon layer 8.

The present invention is wholly different from CATHEY in that formation of the emitter sites or tips require only a single or direct step. Referring to page 9, lines 28 onwards of the PCT application as published: *"The deposited thin film then undergoes laser crystallisation by an excimer laser or nd: YAG laser, in this case a KrF laser ..... **This process results in the surface of the silicon having a rough texture**".* Referring also to page 11, lines 29 onwards, *"The laser interference pattern acts upon the silicon layer 16 in creating areas or dots 18k, of crystallization".* Thus, in the present invention there is only a single step of laser crystallizing portions of the amorphous silicon layer. There is no masking step and no etching step as in CATHEY. In the present invention the emitter sites or tips can be further enhanced by selective etching growth (see page 12, lines 12 onwards). However, the backplate produced according to the present invention is wholly different to that produced in CATHEY. Particularly, in CATHEY the whole silicon amorphous silicon layer is laser crystallized, then masked, and etched to form the tips. In contradistinction in the present invention only portions of the amorphous silicon layer are laser crystallized so as to form the tips. Thus, in CATHEY the backplate provides a crystallized silicon layer with crystallized tips, whereas in the present invention there is provided a backplate having an amorphous silicon layer with crystallized sites or tips formed thereon. This distinction between CATHEY and the present invention has been sought to be clarified in amended claim 6.

In summary, CATHEY is using amorphous silicon as a precursor to forming mono crystalline silicon. This is done by using a laser (and would involve dehydrogenation etc. forming a planar surface). CATHEY then uses conventional photolithographic masking to form

areas under which one can undercut the silicon using etching to form sharp tips, thereby enhancing field emission by geometric confinement.

In the present invention the scenario is completely different, wherein the inventors have used an amorphous silicon precursor. Rather than forming silicon crystal (monocrystal silicon), the inventors use the laser to create extreme surface roughness by using particular energies and leaving the hydrogen in the matrix. The result is a rough surface with features that contain nano-particulates (e.g. crystallites). These confine and enhance the internal electric field.

Thus, in the present invention the amorphous layer remains amorphous with crystallized sites, whereas in CATHEY the entire amorphous layer is crystallized.

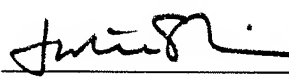
In view of the above, it is respectfully submitted that the present is distinguished on novelty grounds over CATHEY. Further, regarding the Examiner's rejections of dependent claims 7-13, it is respectfully submitted that these rejections are rendered moot, at least in view of their dependency on allowable claim 6.

In view of the above comments it is respectfully submitted that it is clear that the present invention as defined in the presently pending claims is patentably distinguished on both novelty and inventive step grounds over CATHEY. The present invention provides a field emission backplate comprising an amorphous semiconductor based material having a plurality of laser crystallized emitter sites formed thereon. CATHEY does not teach this arrangement, or indeed the method by which this arrangement is formed.

In light of Applicants' amendments and remarks, a notice of allowance is respectfully requested. Should the Examiner have any questions or concerns regarding the amendments, remarks or the above-identified application, then a telephonic interview with the undersigned is respectfully requested to discuss any such questions or concerns and to accelerate the allowance of the above-identified application.

Respectfully submitted,

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